Assignment - 2

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***Abstract*—This document contains the solution to Exercise 2.38 (b) of Oppenheim.**

Problem 1. Determine the coefficients A_m in the homogeneous solution if $y[-1] = 1$ and $y[0] = 0$.

Solution: On substituting the initial conditions in the homogeneous solution ($y_h[n] = A_1(\frac{1}{2})^n + A_2(\frac{1}{4})^n$), we get,

$$y_h[-1] = A_1(\frac{1}{2})^{-1} + A_2(\frac{1}{4})^{-1} = 1 \tag{1}$$

And,

$$y_h[0] = A_1 + A_2 = 0 \tag{2}$$

We get a system of linear equations,

$$\begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ 1 & 1 \end{bmatrix} \begin{bmatrix} A_1 \\ A_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \tag{3}$$

Solving the above system of equations, we get,

$$\begin{bmatrix} A_1 \\ A_2 \end{bmatrix} = \begin{bmatrix} \frac{1}{2} \\ -\frac{1}{2} \end{bmatrix} \tag{4}$$

$\therefore$ the the coefficients A_m in the homogeneous solution are $\frac{1}{2}$ and $-\frac{1}{2}$.